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Candidate number

Surname _____

Forename(s) _____

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GCSE MATHEMATICS

F

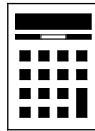
Foundation Tier Paper 2 Calculator

Thursday 7 November 2019 Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

For Examiner's Use	
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
TOTAL	

Advice

In all calculations, show clearly how you work out your answer.



N 0 V 1 9 8 3 0 0 2 F 0 1

Answer **all** questions in the spaces provided

- 1 Simplify $8a - 3a + a$
Circle your answer.

[1 mark]

$4a$

$6a$

 (1)

$5 + a$

$8a - 3a^2$

- 2 Which of these numbers is three less than a square number?
Circle your answer.

[1 mark]

5

19

 22 (1)

34

- 3 Circle the length of time between 1.50 pm and 3.35 pm

[1 mark]

 $1\text{ h }45\text{ min}$

2 h 15 min

2 h 25 min

3 h 5 min

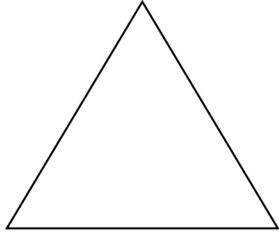
 (1) 

4

Circle the letter of the shape that has rotational symmetry of order 2

[1 mark]

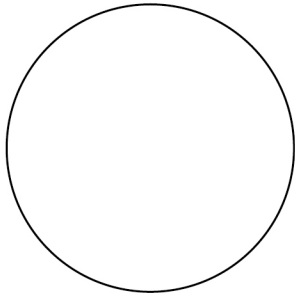
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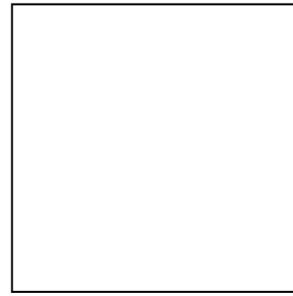
Q



R



S



Turn over for the next question

Turn over ►



5 Here are eight numbers.

4 10 9 3 4 12 5 14

5 (a) Work out the range.

$$14 - 3 = 11$$

[1 mark]

Answer 11 (1)

5 (b) Work out the median.

[2 marks]

3 4 4 5 9 10 12 14

$$\text{median} = \frac{5 + 9}{2} = 7 \quad (1)$$

Answer 7 (1)



6 A shop has this offer.

£5 reduction if you spend more than £100

or

£10 reduction if you spend more than £150

or

£20 reduction if you spend more than £200

At the shop, dresses cost £42 each.

Amira buys 3 dresses.

Bobbi buys 5 dresses.

How much **more** than Amira does Bobbi pay?

[3 marks]

$$\text{Amira : } £42 \times 3 = £126 \quad (1)$$

$$£126 - £5 = £121$$

$$\text{Bobbi : } £42 \times 5 = £210 \quad (1)$$

$$£210 - £20 = £190$$

$$190 - 121 = 69 \quad (1)$$

Answer £ 69

Turn over for the next question



7 (a) Solve $x + 17 = 12$

[1 mark]

$$x = 12 - 17 = -5$$

$$x = \underline{-5} \quad (1)$$

7 (b) Solve $\frac{w}{4} = 12$

[1 mark]

$$w = 12 \times 4$$

$$= 48$$

$$w = \underline{48} \quad (1)$$

7 (c) Simplify fully $\frac{9m}{12m}$

[2 marks]

$$\frac{9 \div 3}{12 \div 3} = \frac{3}{4}$$

$$\text{Answer } \underline{\frac{3}{4}} \quad (2)$$



8 The cost of a taxi journey is £3 plus £2 per mile.
Circle the cost of a journey of 6 miles.

$$3 + 6(2) = 15$$

£5

£12

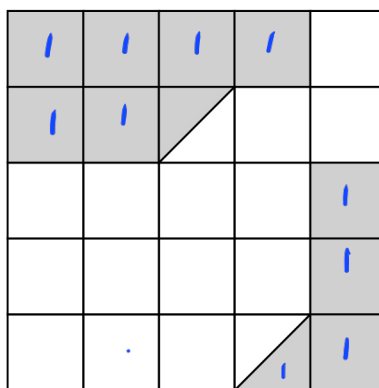
£15

£30

[1 mark]

9 What percentage of this shape is shaded?

[2 marks]






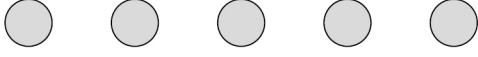
$$\frac{10}{25}$$

$$\frac{10}{25} \times 100\% = 40\%$$

Answer 40 ⁽²⁾ %



- 10** A group of students were asked to name their favourite burger.
The pictogram shows the results.
The key is missing.

Chicken	
Beef	
Turkey	
Veggie	

40 students said Veggie.

How many students said Chicken?

[3 marks]

$$40 \div 5 = 8 \text{ (1)}$$

$$8 \times 3.5 = 28 \text{ (1)}$$

Answer 28 (1)



11 $c = 250 - 16^2$

$$d = \frac{18 \times 14}{-28}$$

Work out the value of $c \times d$

[2 marks]

$$c = 250 - 256 = -6$$

$$d = \frac{252}{-28} = -9$$

$$c \times d = -6 \times -9$$

$$= 54$$

Answer

54

(2)

12 When a spinner is spun, it shows
Blue (B) or Green (G) or Red (R) or White (W).

When a coin is tossed, it shows
Heads (H) or Tails (T).

The spinner is spun and the coin is tossed.

Complete this list of possible outcomes.

[2 marks]

BH BT

GH GT

RH RT

WH WT

(2)



13

A quadrilateral $PQRS$ has

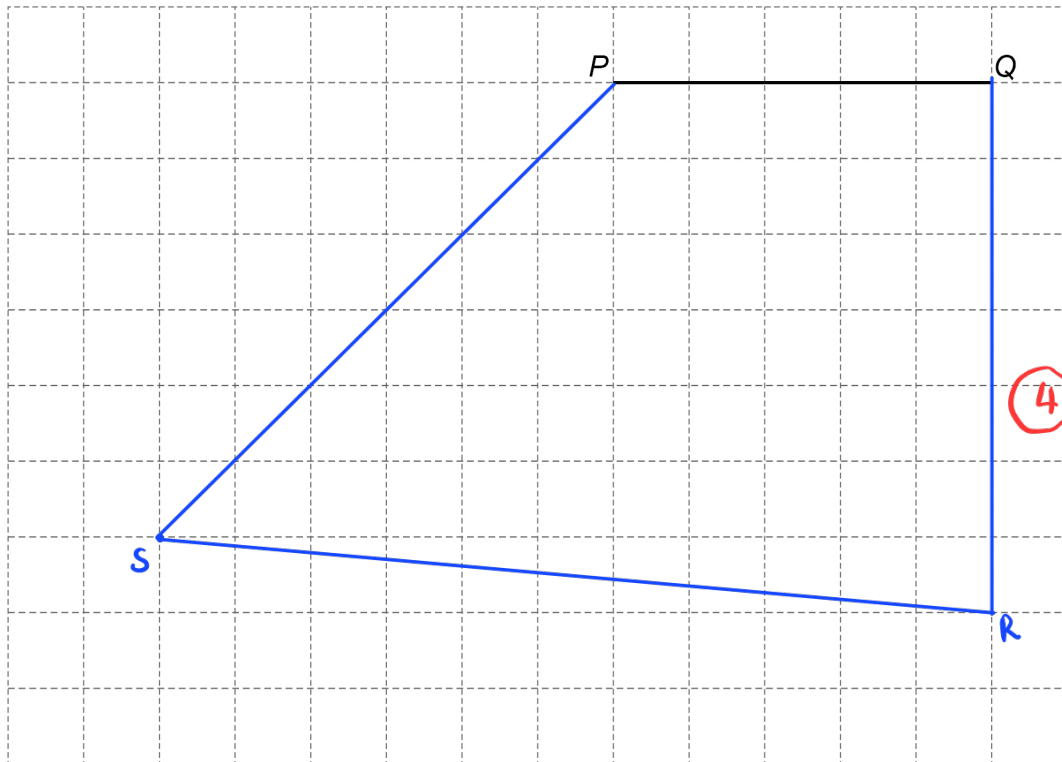
$$PQ = 5 \text{ cm}$$

 QR perpendicular to PQ

$$QR = 7 \text{ cm}$$

$$\text{angle } QPS = 135^\circ$$

$$PS = 8.5 \text{ cm}$$

On the grid, draw the quadrilateral $PQRS$. PQ has been drawn for you.**[4 marks]**

14 Circle the solid that has six vertices.

[1 mark]

cone

cuboid

triangular prism

square-based pyramid

15 Which of these fractions is closer in value to 1?

$$\frac{3}{4}$$

$$\frac{13}{10}$$

You **must** show your working.

[2 marks]

$$\frac{3}{4} = 0.75$$

$$\frac{13}{10} = 1.3$$

$$1 - 0.75 = 0.25$$

$$1.3 - 1 = 0.3$$

Answer

$$\frac{3}{4}$$

(1)

Turn over for the next question



16 Three teams, A, B and C, play in a competition.

games won by A : games won by B = 2 : 1

games won by B : games won by C = 3 : 1

Team B has won 6 games.

In total, how many games have the three teams won?

[3 marks]

$$A : B : C$$

$$2 \times 3 : 1 \times 3$$

$$3 : 1$$

$$6 : 3 : 1$$

$$A : \frac{6}{3}(6) = 12 \quad C : \frac{1}{3}(6) = 2 \quad \text{Total} : 12 + 6 + 2 = 20$$

Answer 20



17 Match each expression in Column P with the equivalent expression in Column Q.
One has been done for you.

[3 marks]

Column P

Column Q

$$a^2 \times a$$

$$6a$$

$$2a \times 3$$

$$5a$$

$$12a^2 \div 2$$

$$a^3$$

$$10 \times \frac{1}{2}a^2$$

$$5a^2$$

$$6a^2$$

3

Turn over for the next question

6

Turn over ►



18 A drink is made by adding water to juice.

Instructions

Add an amount of water that is between 2 times and 3 times the amount of juice

Rana has 120 ml of juice.

She adds some water.

She has now made 450 ml of the drink.

Has Rana followed the instructions?

You **must** show your working.

[3 marks]

$$2 \times 120 \text{ ml} = 240 \text{ ml} \quad (1)$$

$$3 \times 120 \text{ ml} = 360 \text{ ml}$$

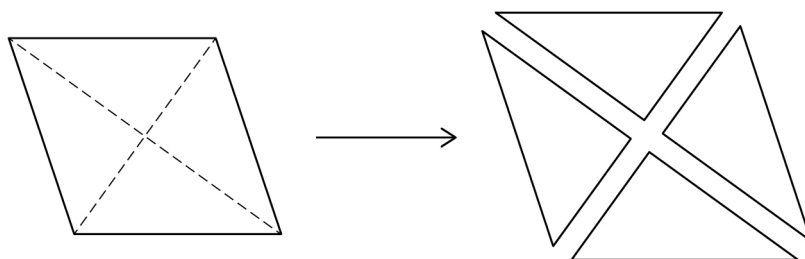
$$450 \text{ ml} - 120 \text{ ml} = 330 \text{ ml} \quad (1)$$

Yes, Rana followed the instruction since
the water she used is within the limit. (1)



19

A rhombus is cut along the diagonals to make four triangles.



Not drawn
accurately

Which **three** statements are correct for any rhombus?

Tick **three** boxes.

[2 marks]

All four triangles are right-angled

All four triangles are isosceles

2

All four triangles are congruent

Area of rhombus = $4 \times$ area of one triangle

Perimeter of rhombus = $4 \times$ perimeter of one triangle

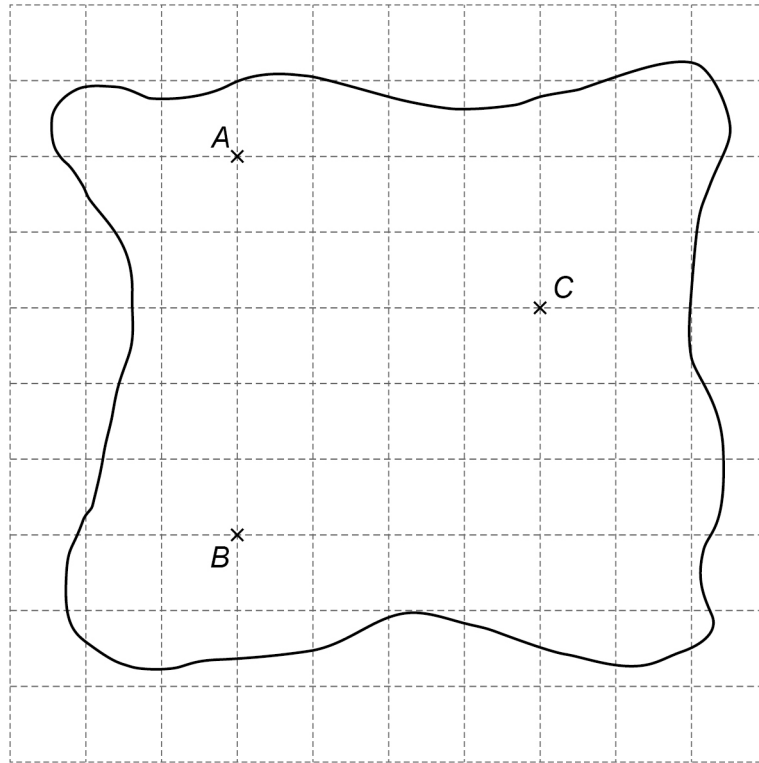
Turn over for the next question

5

Turn over ►



- 20 A map of an island is shown on a centimetre grid.
A, B and C are houses.



- 20 (a) The actual distance between A and B is 1500 metres.

Show that the scale on the map is 1 : 30 000

[2 marks]

$$1500 \times 100 = 150\,000 \text{ cm} \quad (1)$$

$$\frac{150\,000}{30\,000} = 5 \quad \text{which is the same as length AB (5 cm)} \quad (1)$$



- 20 (b) Work out the actual distance between A and C.
Give your answer in kilometres.

[4 marks]

$$AC = 4.5 \text{ cm} \quad (1)$$

$$4.5 \times 30\,000 = 135\,000 \text{ cm} \quad (1)$$

$$135\,000 \text{ cm} \times \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{1 \text{ km}}{1000 \text{ m}} \quad (1)$$

$$= 1.35 \text{ km} \quad (1)$$

Answer 1.35 km

- 21 a and b are both prime numbers.
They are each less than 20
Give an example where $a + b$ is odd but **not** prime.

[2 marks]

$$\text{let } a = 2, b = 7$$

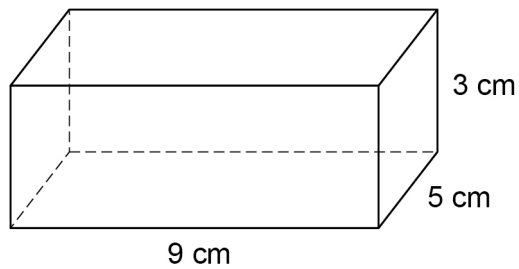
$$a + b = 2 + 7 = 9$$

$$a = \underline{2} \quad (2) \quad b = \underline{7}$$



22

Here is a cuboid.

The two **largest** faces are blue.

The other four faces are green.

Is the total blue area greater than the total green area?

You **must** show your working.**[3 marks]**

$$\text{Blue: } 2 \times (9 \times 5) \quad (1)$$
$$= 90 \text{ cm}^2$$

$$\text{Green: } 2 \times (9 \times 3) + 2 \times (5 \times 3) \quad (1)$$
$$= 54 \text{ cm}^2 + 30 \text{ cm}^2$$
$$= 84 \text{ cm}^2$$

Yes. $90 > 84$. (1)



23

The result of a game is Win, Lose or Draw.

After 80 games

relative frequency of the result Win is 0.4

relative frequency of the result Lose is 0.25

How many of the games had the result Draw?

[3 marks]

$$1 - 0.4 - 0.25 = 0.35 \quad (1)$$

$$0.35 \times 80 = 28 \quad (1)$$

(1)

Answer 28

24

Work out the lowest common multiple (LCM) of 120 and 144

[2 marks]

$$120 = 2 \times 2 \times 2 \times 3 \times 5$$

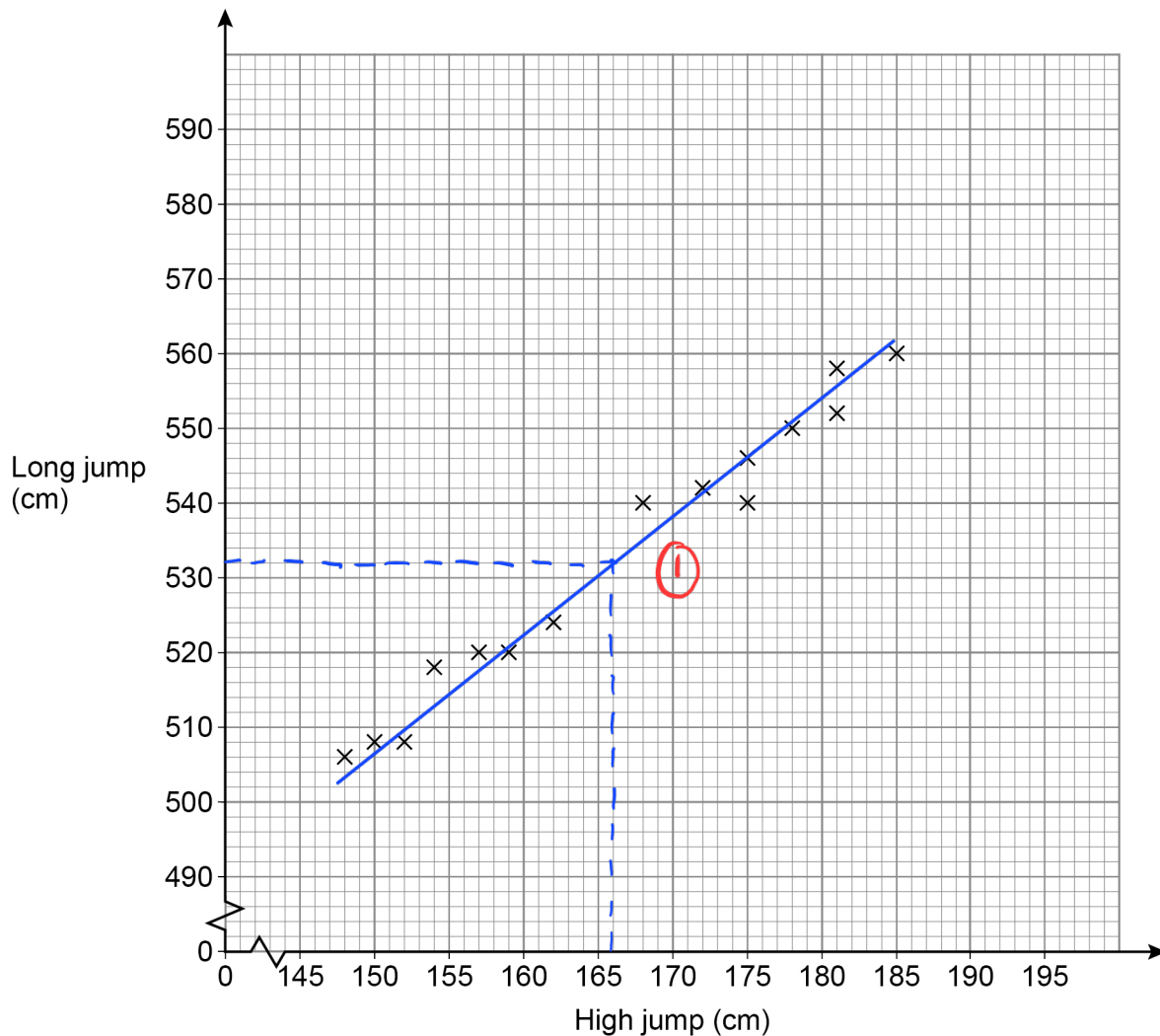
$$144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \quad (1)$$

$$\text{Lcm} : 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 = 720 \quad (1)$$

Answer 720



25 The scatter graph shows the best high jump and the best long jump for 15 boys.



25 (a) Write down the type of correlation shown.

[1 mark]

Answer Positive (1)



25 (b) Liam has a best high jump of 166 cm

Use a line of best fit to estimate his best long jump.

[2 marks]

Answer 532 ⁽¹⁾ cm

25 (c) Another boy has a best high jump of 195 cm

Give a reason why you should **not** use a line of best fit to estimate his best long jump.

[1 mark]

195 exceeds this data ⁽¹⁾

Turn over for the next question



26

A car journey is in two stages.

Stage 1 The car travels 110 miles in 2 hours.

Stage 2 The car travels 44 miles at the same average speed as Stage 1

Work out the time for Stage 2

Give your answer in minutes.

[3 marks]

$$\text{speed}_1 : \frac{110}{2} = 55 \quad (1)$$

$$\text{time}_2 : \frac{44}{55} = 0.8 \text{ hours} \quad (1)$$

$$0.8 \times 60 = 48 \text{ min} \quad (1)$$

Answer 48 minutes

27

Here is an identity.

$$a(3x - 10) \equiv 21x + 2b$$

Work out the values of a and b .

[3 marks]

$$a = 7 \quad (2)$$

$$7(3x - 10) = 21x - 70$$

$$2b = -70$$

$$b = -35 \quad (1)$$

$a =$ 7 $b =$ -35



28

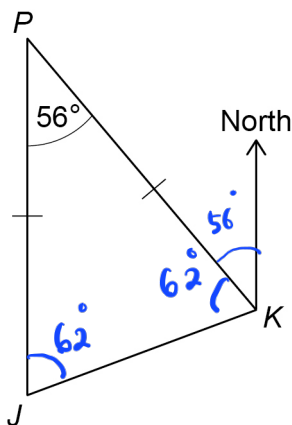
J and *K* are ships.

P is a port.

J is due South of *P*.

Angle $JPK = 56^\circ$

$JP = KP$



Not drawn
accurately

Work out the bearing of *J* from *K*.

[3 marks]

$$180^\circ - 56^\circ = 124^\circ$$

$$124 \div 2 = 62^\circ \quad (1)$$

$$360^\circ - 62^\circ - 56^\circ = 242^\circ \quad (1)$$

(1)

Answer 242 °

Turn over for the next question



29

The 5th term of a linear sequence is 17

The 6th term of the sequence is 21

Work out the 100th term of the sequence.

[3 marks]

$$T_5 = a + 4d = 17$$

$$d = 4 \quad (1)$$

$$a = 17 - 4(4)$$

$$= 1 \quad (1)$$

$$T_{100} = 1 + 99(4)$$

$$= 397 \quad (1)$$

Answer 397

30

$$\mathbf{a} = \begin{pmatrix} 2 \\ 7 \end{pmatrix} \quad \mathbf{b} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$$

Work out $3\mathbf{a} + \mathbf{b}$

[2 marks]

$$3 \begin{pmatrix} 2 \\ 7 \end{pmatrix} + \begin{pmatrix} 5 \\ -2 \end{pmatrix}$$

$$= \begin{pmatrix} 6 \\ 21 \end{pmatrix} + \begin{pmatrix} 5 \\ -2 \end{pmatrix}$$

$$= \begin{pmatrix} 11 \\ 19 \end{pmatrix} \quad (2)$$

Answer

$$\begin{pmatrix} 11 \\ 19 \end{pmatrix}$$



31

The value of a house is £120 000

The value is expected to increase by 5% each year.

Work out the expected value after 4 years.

Give your answer to 2 significant figures.

You **must** show your working.

[4 marks]

$$120\,000 \times 1.05 = 126\,000 \quad (1)$$

$$126\,000 \times 1.05 = 132\,300$$

$$132\,300 \times 1.05 = 138\,915 \quad (1)$$

$$138\,915 \times 1.05 = 145\,860.75 \quad (1)$$

$$\approx 150\,000$$

Answer £ 150 000 (1)

END OF QUESTIONS

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2 8



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